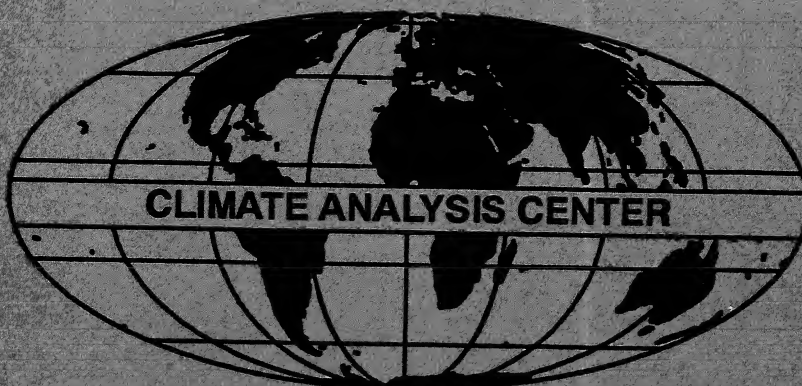


**CONTAINS:**  
MAY 1993  
AND SPRING  
(MARCH -  
MAY) 1993  
GLOBAL  
CLIMATE  
ANOMALIES



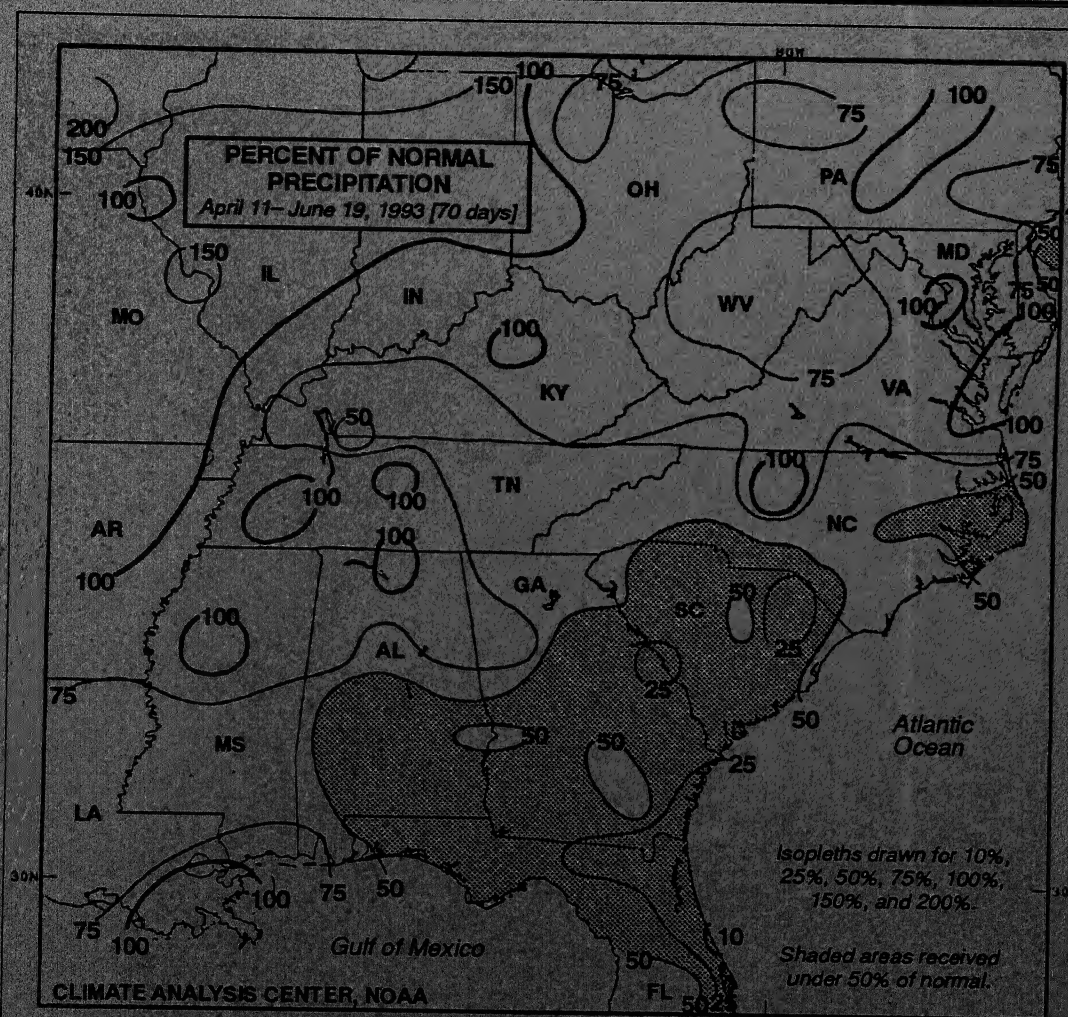
**CONTAINS:**  
SPECIAL  
UPDATES ON  
HEAVY RAINS  
IN JAPAN AND  
ON TROPICAL  
STORM  
ARLENE

# WEEKLY CLIMATE BULLETIN

No. 93/25

Washington, DC

June 23, 1993



## MOISTURE DEFICITS SLOWLY INCREASE ACROSS PORTIONS OF THE SOUTHEAST.

While much of the nation has been preoccupied with problems resulting from above normal precipitation, large sections of the Deep South and South Atlantic Coast have watched precipitation shortages gradually develop. Since April 11, 1993, less than half of normal precipitation fell on eastern and southern North Carolina, most of South Carolina, central and southern sections of Alabama and Georgia, and northern and eastern portions of Florida. Below normal precipitation was also observed through parts of the central and southern Appalachians, the Ohio Valley, and the central Gulf Coast. Northern South Carolina, extreme northern and eastern Georgia, and eastern Florida appear to be most severely affected, with only 20-60 mm of rain measured during the last ten weeks. Precipitation deficits exceeding 100 mm were widespread through the affected region, and shortfalls reached as high as 208 mm on the eastern Florida Panhandle. Fortunately, the dry spell followed a relatively wet period, keeping agricultural and hydrologic impacts to a minimum so far. In sharp contrast, between 250 and 465 mm of rain fell on most of the Corn Belt during the same period, generating precipitation surpluses as up to 241 mm.



UNITED STATES DEPARTMENT OF COMMERCE  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION  
NATIONAL WEATHER SERVICE-NATIONAL METEOROLOGICAL CENTER  
**CLIMATE ANALYSIS CENTER**





# GLOBAL CLIMATE HIGHLIGHTS

## MAJOR CLIMATIC EVENTS AND ANOMALIES AS OF JUNE 19, 1993

### 1. Western United States:

#### **WET SPELL ENDS.**

Less than 30 mm of rain fell on most of Washington, Oregon, and northern California as seasonably dry weather returned [Ended at 5 weeks].

### 2. North-Central United States:

#### **HEAVY RAINS ENGENDER FLOODING.**

Heavy thundershowers dumped up to 200 mm of rain on some locations (page 4). According to press reports, the Black River in Wisconsin spilled out of its banks. In Iowa and Minnesota, farmers remained unable to plant many crops in saturated fields [Episodic Events].

### 3. South-Central and Southeastern United States:

#### **TORRENTIAL RAINS DRENCH TEXAS AND LOUISIANA; SOUTHEAST STILL DRY.**

Tropical Storm Arlene inundated eastern Texas and western Louisiana with very heavy rain (page 4) [Episodic Event]. Farther east, dry weather persisted across the Southeast as precipitation amounts of 20 mm or less were reported again last week (front cover). Six-week moisture deficits ranged from 70 to 130 mm [8 weeks].

### 4. British Isles:

#### **STILL VERY WET.**

Moderate precipitation (20 to 40 mm) soaked Ireland and the United Kingdom as abnormally moist conditions persisted [6 weeks].

### 5. South-Central Europe:

#### **DRY WEATHER PERSISTS, BUT TEMPERATURES MODERATE.**

Temperatures averaged as much as 3°C below normal as the heat wave in Europe ended [Ended at 10 weeks - WARM]. Although as much as 90 mm of precipitation fell on the Alps, most areas received less than 20 mm as six-week moisture deficits reached 50 to 140 mm [10 weeks - DRY].

### 6. Southwestern Asia:

#### **MOISTURE SURPLUSES REMAIN.**

Six-week precipitation excess ranged from 50 to 150 mm as up to 160 mm of rain soaked the Ukraine last week [7 weeks].

### 7. Afghanistan and Pakistan:

#### **HIGH TEMPERATURES AND HEAVY RAINS REPORTED.**

Temperatures soared to 44°C in Pakistan and 49°C in Afghanistan early in the week, but cooler weather spread across the region as the week progressed. According to press reports, nearly 80 mm of rain engendered flooding and landslides that claimed over 100 lives in Pakistan [Episodic Events].

### 8. Korea and Northeastern China:

#### **MORE WET WEATHER.**

Torrential rains, with totals approaching 130 mm, inundated Korea while up to 60 mm soaked northeastern China [10 weeks]. Farther west, continued light to moderate rains eliminated large short-term moisture deficits [Ended at 5 weeks].

### 9. Taiwan and Southeastern China:

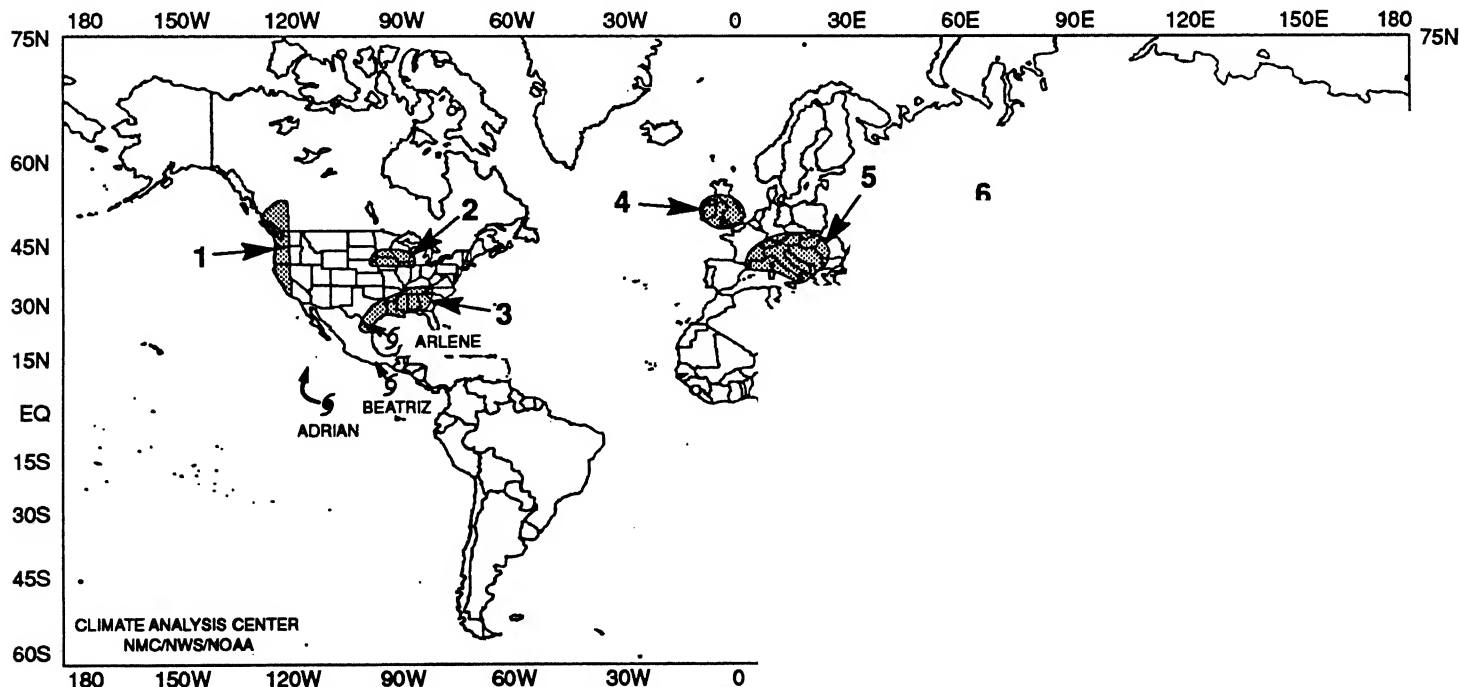
#### **ABUNDANT RAINFALL CONTINUES.**

Up to 280 mm of rain drenched the region as six-week precipitation surpluses remained as high as 300 mm. Daily totals reached 160 mm in south-central China [10 weeks].

### 10. Philippines:

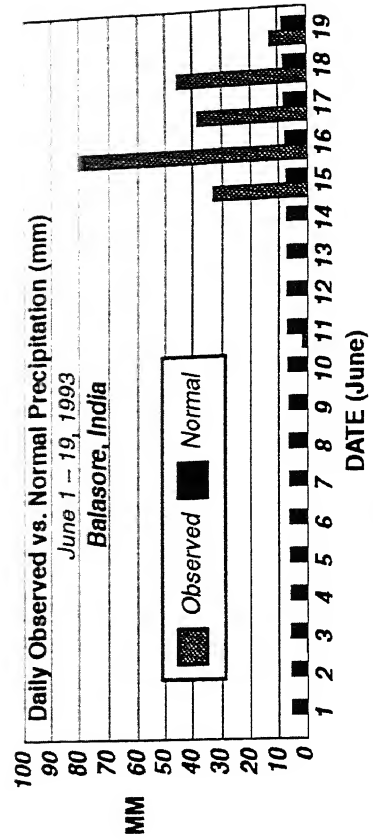
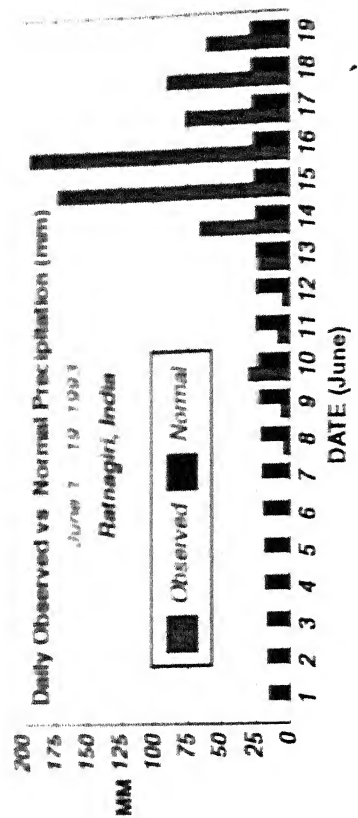
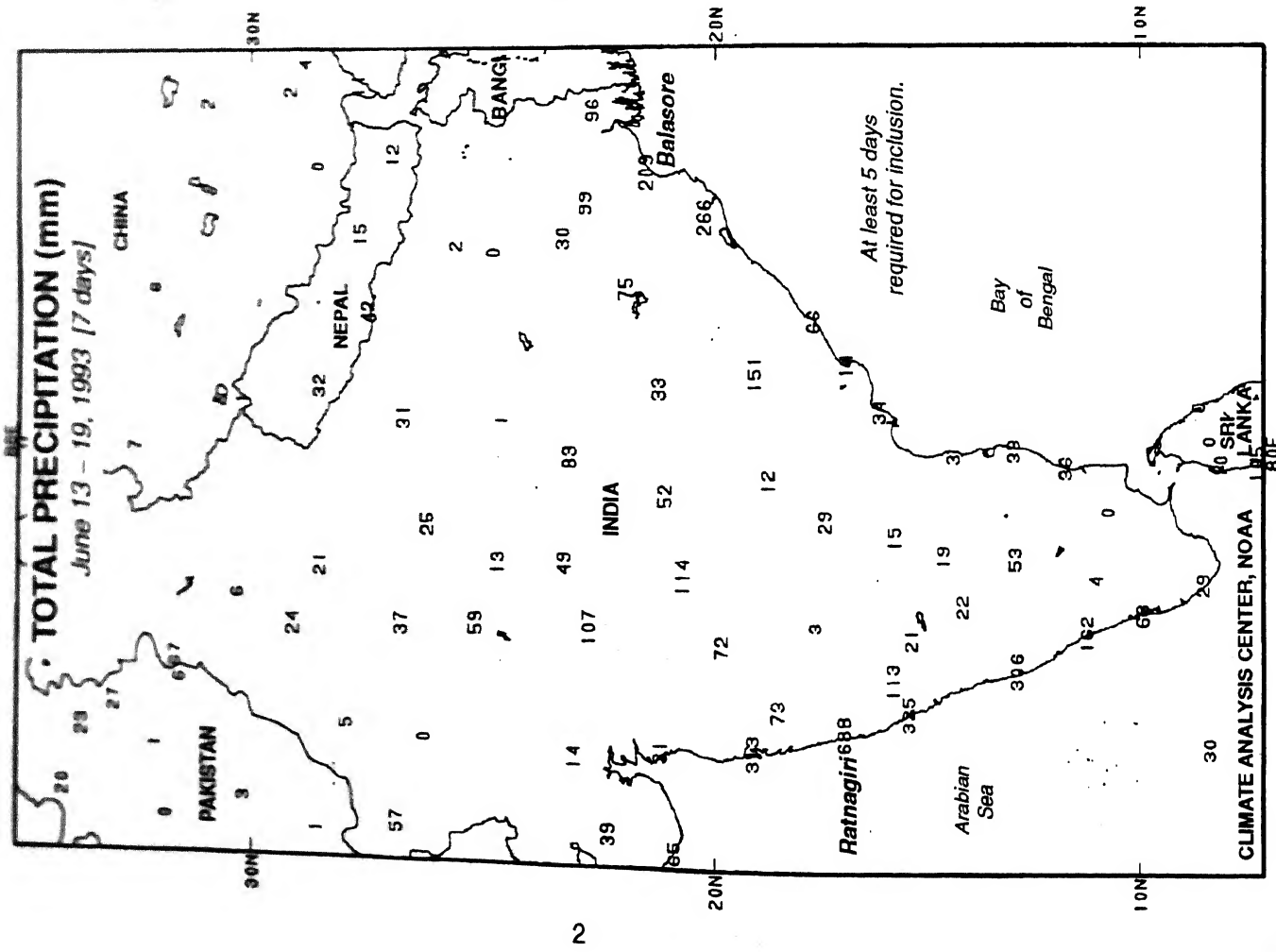
#### **RAINS PROVIDE LIMITED RELIEF.**

Heavy thundershowers dropped as much as 200 mm of rain on isolated locations, but most areas received only 20 to 50 mm. Despite the rains, six-week moisture deficits of 100 to 350 mm remained widespread across the islands [8 weeks].



#### **EXPLAN**

TEXT: Approximate duration of anomalies is in brackets. Precipitation  
MAP: Approximate locations of major anomalies and episodic events  
temperature anomalies, four week precipitation anomalies, long-



**MODERATE TO HEAVY MONSOONAL RAINS BECAME WIDESPREAD ACROSS MOST OF INDIA, BANGLADESH, NEPAL, AND PAKISTAN.**

Moderate totals of 15-150 mm fell on most of the region as monsoonal rains arrived approximately on schedule across central and north-central India and portions of Nepal. In addition, scattered totals of up to 70 mm fell on extreme western and northern India as well as the northern portions of Pakistan, where seasonal rains are not typically observed until late June or July. Rainfall, however, was excessively heavy in parts of southwestern and eastern India and across Bangladesh, although reliable data are lacking in the latter two regions. Daily totals approaching 200 mm fueled weekly amounts reaching 688 mm at Ratnagiri, India, while 200-270 mm of rain were measured in east-central India near the Bangladesh border. According to press reports, over 200 lives were lost and at least 50,000 individuals near Chittagong, Bangladesh were left homeless by floods, which destroyed approximately 400,000 hectares of rice and jute crops across the country last week. Recent widespread flooding has left Bangladesh rife with water-borne diseases and a lack of food and potable water. Farther east (off map), flooding also swept through portions of extreme eastern India, triggering landslides that took half a dozen lives.



# UNITED STATES WEEKLY CLIMATE HIGHLIGHTS

## FOR THE WEEK OF JUNE 13-19, 1993

Powerful storm systems again swept through the nation's midsection, accompanied by tornadoes, high wind, large hail, and heavy rain. During the first part of the week, severe thunderstorms barreled across the middle Missouri, upper and middle Mississippi, Ohio, and Tennessee Valleys, the Great Lakes, and the Northeast ahead of and along a strong eastward-moving cold front. On Sunday, tornadoes and baseball-sized hail battered northwestern Kansas while golfball sized hail pelted parts of Missouri, Nebraska, and Iowa. Up to two and a half inches of rain fell in one hour on south-central Iowa while high wind gusts near Corning, IA, damaged a trailer and blew a police car off the road. Heavy rain, hail, and high winds hit southern Ohio on Monday, knocking out power to about 60,000 homes. Thunderstorm winds hit central New York on Tuesday, causing power lines to fall and ignite fires, according to press reports. Farther west, another cold front raced across the Pacific Northwest on Monday and into the central United States by mid-week, where the system slowed and edged eastward. Moist, unstable air streamed northward from the Gulf ahead of the system, fueling strong thunderstorms and heavy rain from the middle Missouri Valley to the upper Great Lakes. Up to six and a half inches of rain caused flash floods across southern Minnesota. Persistent rains from Wednesday into the weekend produced severe flooding through central Wisconsin, where eight inches of rain forced the Black River out of its banks and broke a 50-foot section of a dam near Hatfield. At least 700 people were evacuated from Jackson and Clark Counties, according to press reports.

At the start of the week, severe thunderstorms extended from the central Plains to the upper Great Lakes ahead of an eastward-moving cold front. Thunderstorms were also scattered in the hot, humid air across the lower Mississippi Valley, Southeast, and western Gulf Coast. Over two inches of rain in 40 minutes caused a 100-foot sinkhole to open up under a parking lot in downtown Atlanta, GA, killing a woman who was trapped in her car, authorities said. Extremely hot weather hung over the West, with temperatures reaching the century mark in the desert Southwest. By Tuesday, the cold front in the central States spread severe weather and heavy rain across the Midwest and into the Northeast. Farther west, a Pacific cold front brought precipitation into the Northwest and the northern and central Rockies. Scattered showers and thunderstorms lingered in the hot, muggy air from the central and southern Plains to the middle and southern Atlantic coast. Thunderstorms generated high wind gusts, hail, and heavy rain across Oklahoma and the Texas panhandle while some small tornadoes touched down in west-central Florida.

At mid-week, the northern part of the eastern cold front moved into the Atlantic with the southern

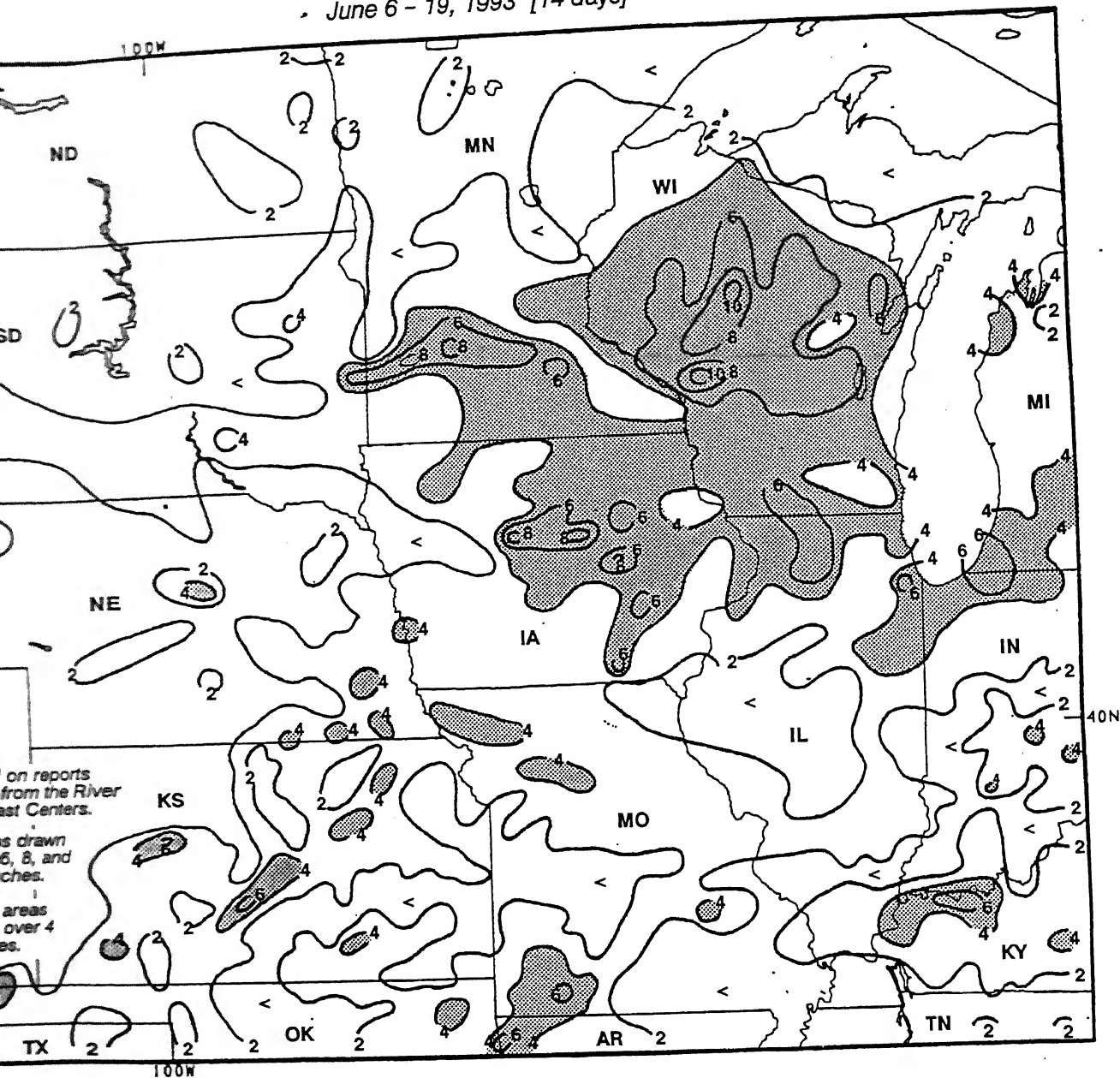
becoming stationary from the North Carolina coast to northern Arkansas. Meanwhile, the western front stalled and extended across the central Rockies and middle Missouri Valley. Showers and thunderstorms were widespread over the upper Great Lakes, lower and upper Mississippi Valley, Great Plains, and central Rockies. During the latter part of the week, the western cold front moved slowly eastward while showers and thunderstorms continued to develop along and ahead of the system, causing flooding in Minnesota, Iowa, and Wisconsin. On Thursday, moderate to heavy snow of up to a foot blanketed the higher elevations of Wyoming. At week's end, Arlene, the first tropical storm of the season, made landfall over southern Texas. Although only a minimal tropical storm, (with sustained winds of 15 mph), Arlene inundated much of southern and eastern Texas with torrential rain.

According to the River Forecast Centers, the greatest weekly precipitation totals (between two and ten inches) came from the Texas panhandle and Oklahoma northward to eastern South Dakota and northeastward to Michigan as well as over southeastern and eastern Texas and western southern Louisiana. Amounts of more than two inches were also scattered across the Southeast, the Appalachians, central Rockies, the northern Cascades, southern Alaska, and the remainders of the Great Plains and Mississippi and Ohio Valleys. Light to moderate precipitation was measured on the Big Island of Hawaii and the remainders of the Northwest, the Rockies, southern Alaska, and the eastern two-thirds of the nation. Little or no precipitation was reported over the desert Southwest, the Great Basin, California, and the remainders of Alaska and

Tr

# NORTH AMERICAN CLIMATE HIGHLIGHTS FEATURE

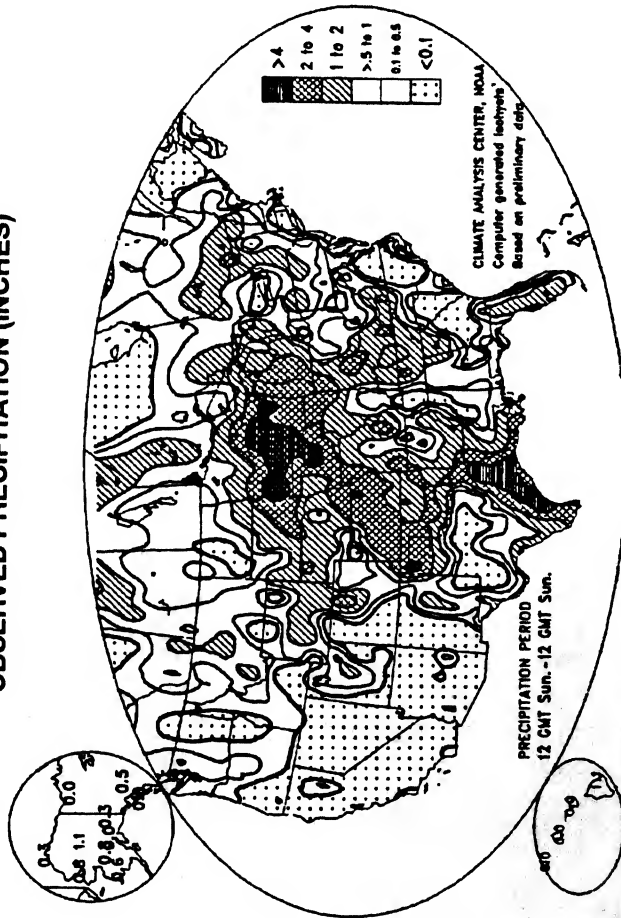
**TOTAL PRECIPITATION (in)**  
June 6 - 19, 1993 [14 days]



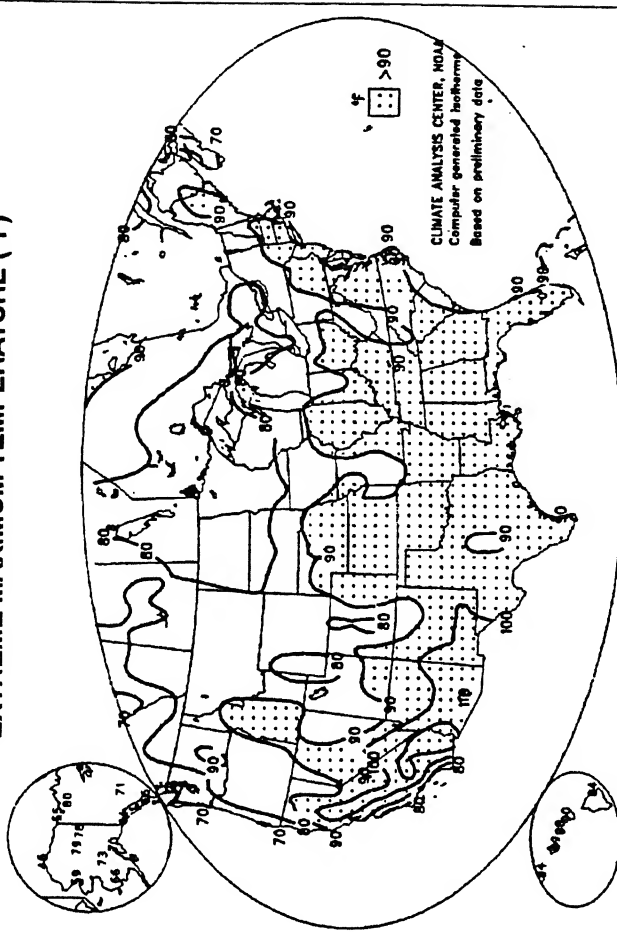
**THUNDERSHOWERS GENERATE SEVERE WEATHER AND SCATTERED FLOODING ACROSS THE NORTH-CENTRAL GREAT PLAINS AND UPPER MIDWEST.** For the last two weeks, large thunderstorm complexes repeatedly battered many of the central Great Plains northward and eastward across the Midwest and Great Lakes. Over four inches of rain drenched scattered portions of western Kentucky, western Missouri, central and northeastern Kansas, southeastern Nebraska, and northern Michigan. A large area from south-central Minnesota and central Iowa east-northeastward across most of Wisconsin, northern portions of Illinois and Indiana, and southern Michigan. Amounts topped eight inches in parts of Iowa, Minnesota, Illinois, and Wisconsin, with a high of 11.3 inches in west-central Wisconsin. According to press reports, the spate of rain sent the Black River out of its banks, necessitating the evacuation of more than 500 individuals from Black River Falls, WI and Hatfield, WI. Water was knee-deep in portions of Black River Falls, WI while much deeper water completely submerged many homes in Hatfield, WI. Governor Tommy Thompson declared Jackson Counties to be disaster areas.

# UNITED STATES WEEKLY CLIMATE CONDITIONS (June 13 – 19, 1993)

OBSERVED PRECIPITATION (INCHES)



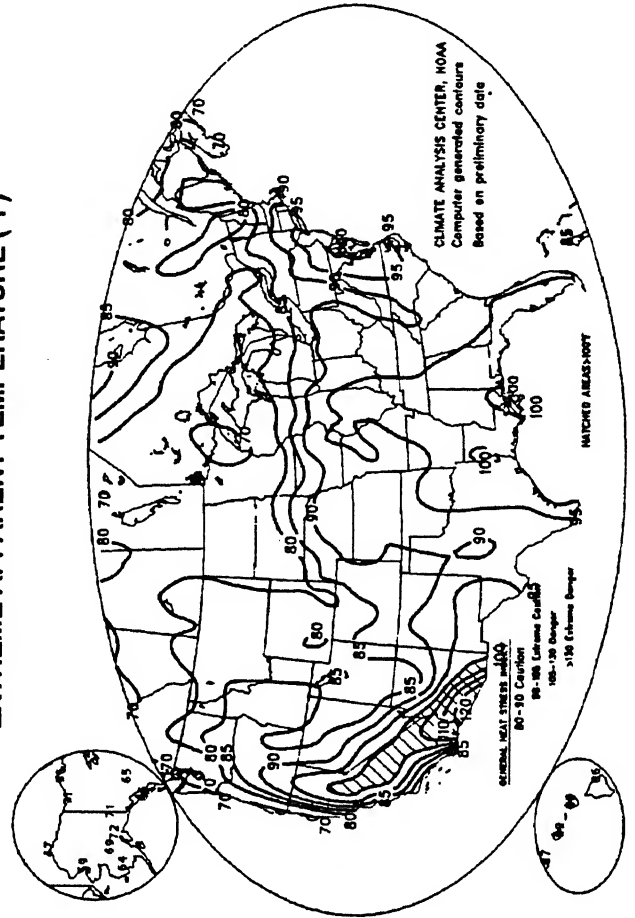
EXTREME MAXIMUM TEMPERATURE (°F)



EMPERATURE  
F)

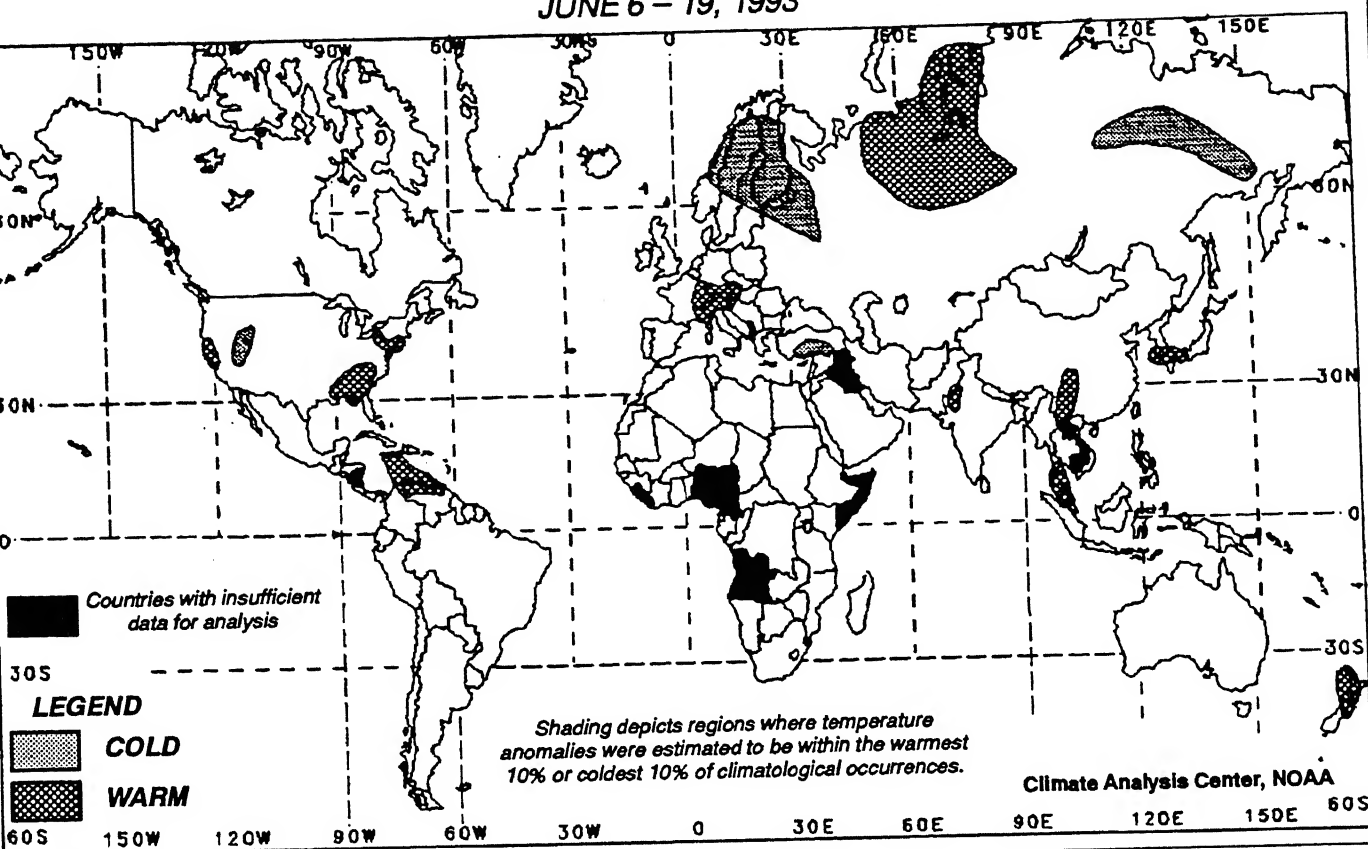


EXTREME APPARENT TEMPERATURE (°F)



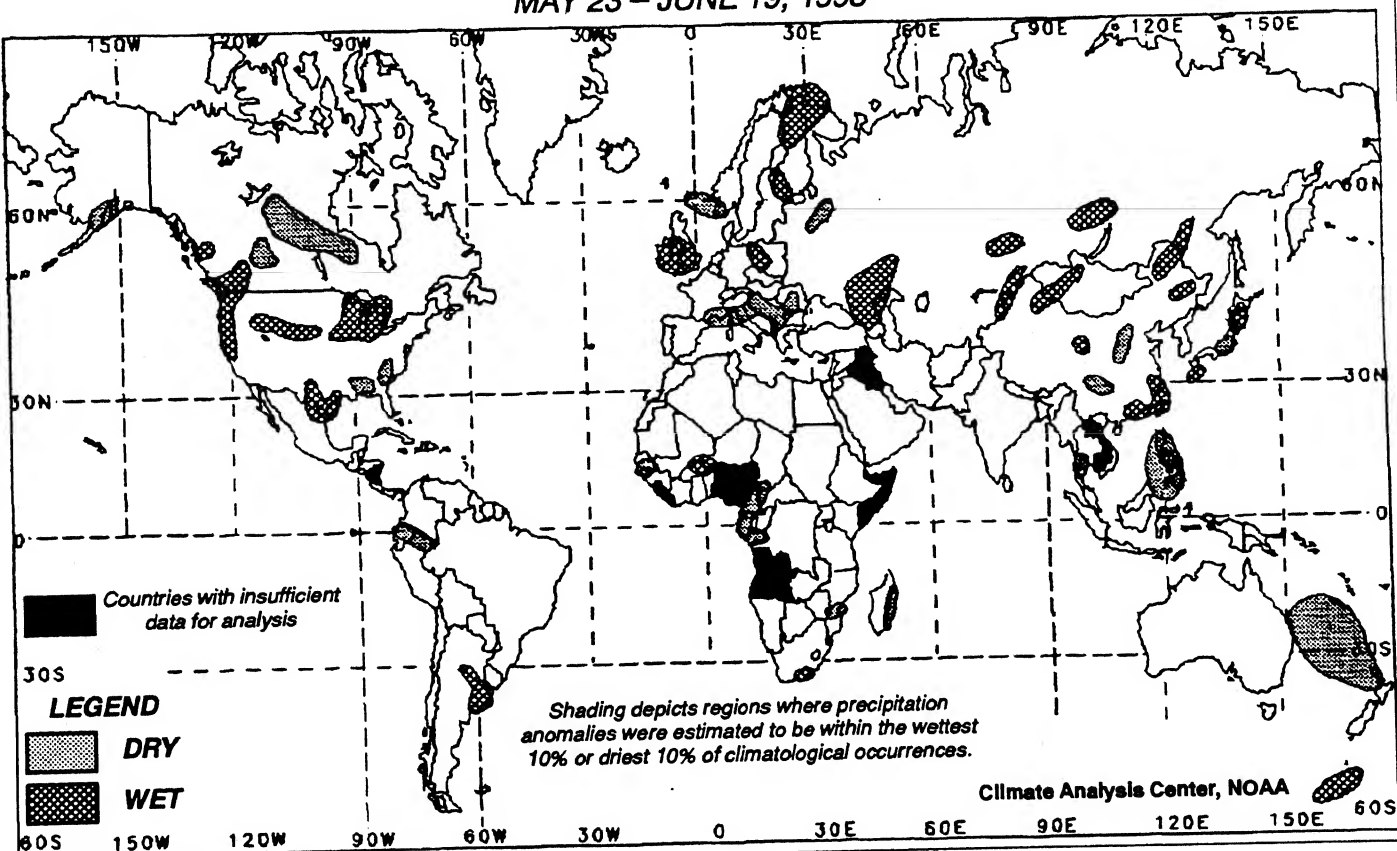
## TWO-WEEK GLOBAL TEMPERATURE ANOMALIES

JUNE 6 - 19, 1993



## FOUR-WEEK GLOBAL PRECIPITATION ANOMALIES

MAY 23 - JUNE 19, 1993

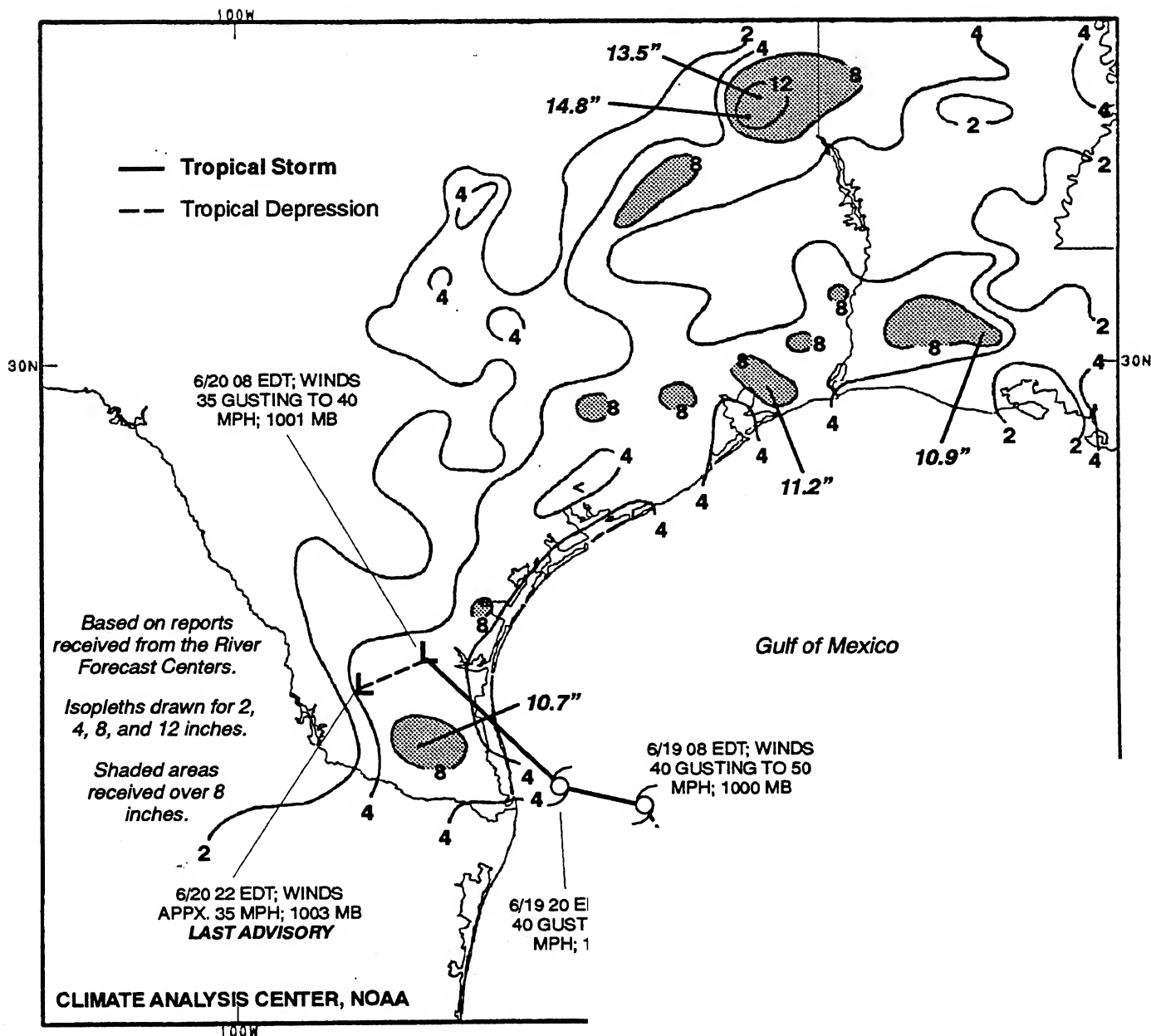




# SPECIAL CLIMATE UPDATE

## TOTAL PRECIPITATION (in) and PATH OF TROPICAL STORM ARLENE

June 17 – 21, 1993 [5 days]

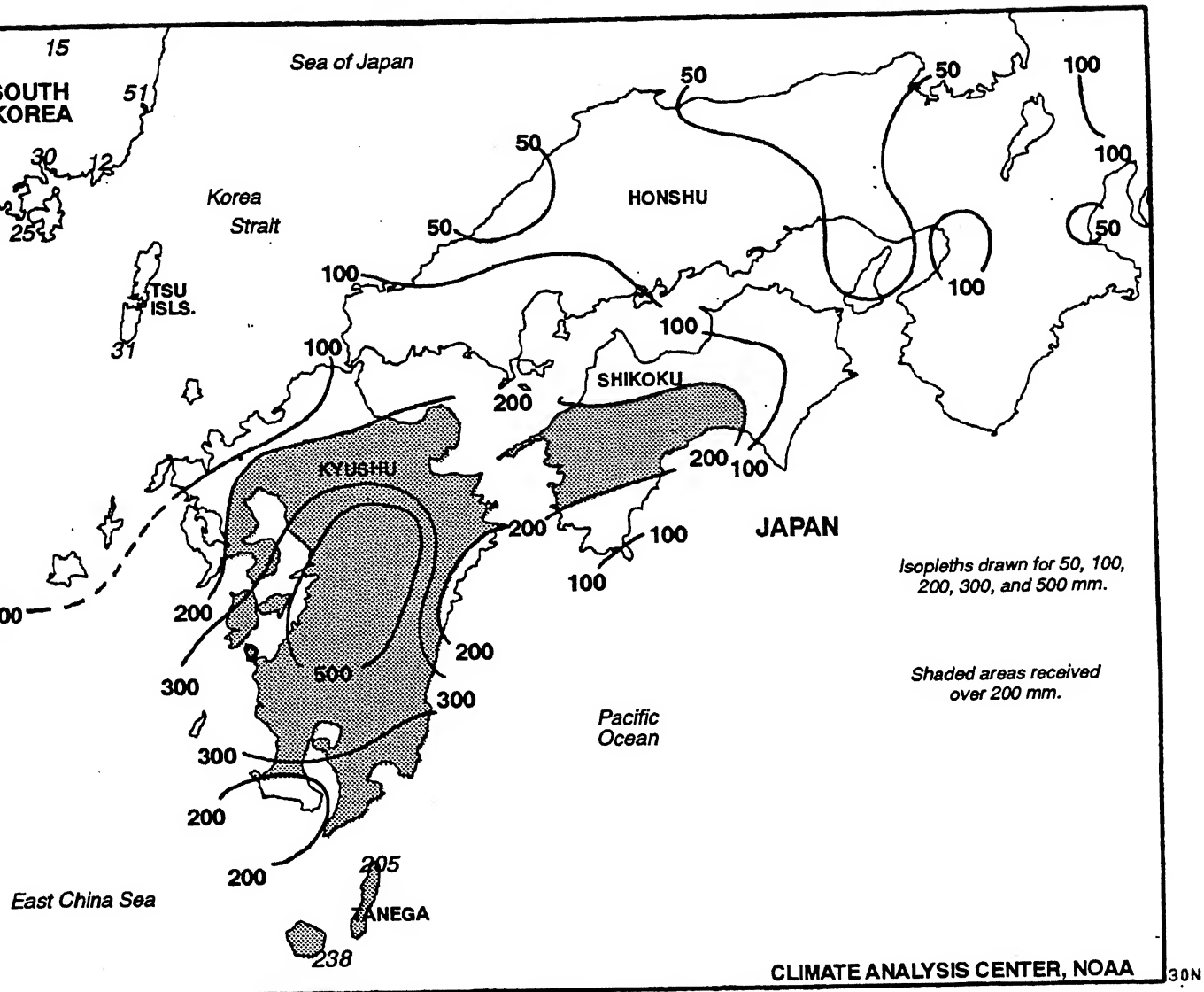


**THUNDERSHOWERS ASSOCIATED WITH TROPICAL STORM ARLENE IN LOUISIANA.** The tropical wave that eventually became Arlene dropped up into the Gulf of Mexico and developing into the region's second tropical depression. Tropical Storm Arlene, slowly moved westward into southern Texas, and generated heavy showers and thunderstorms through eastern Texas and western Louisiana during the five-day period. According to press reports, floodwaters were as much as five feet deep in some areas, but widespread severe flash flooding was not a problem. Reports indicated that about 4,000 homes were destroyed as the tropical wave moved through the area. While Tropical Storm Arlene made landfall in southern Texas, a number of reports indicated that about 300 people in Matamoros (across the border from Brownsville)

## SPECIAL CLIMATE UPDATE

### TOTAL PRECIPITATION (mm)

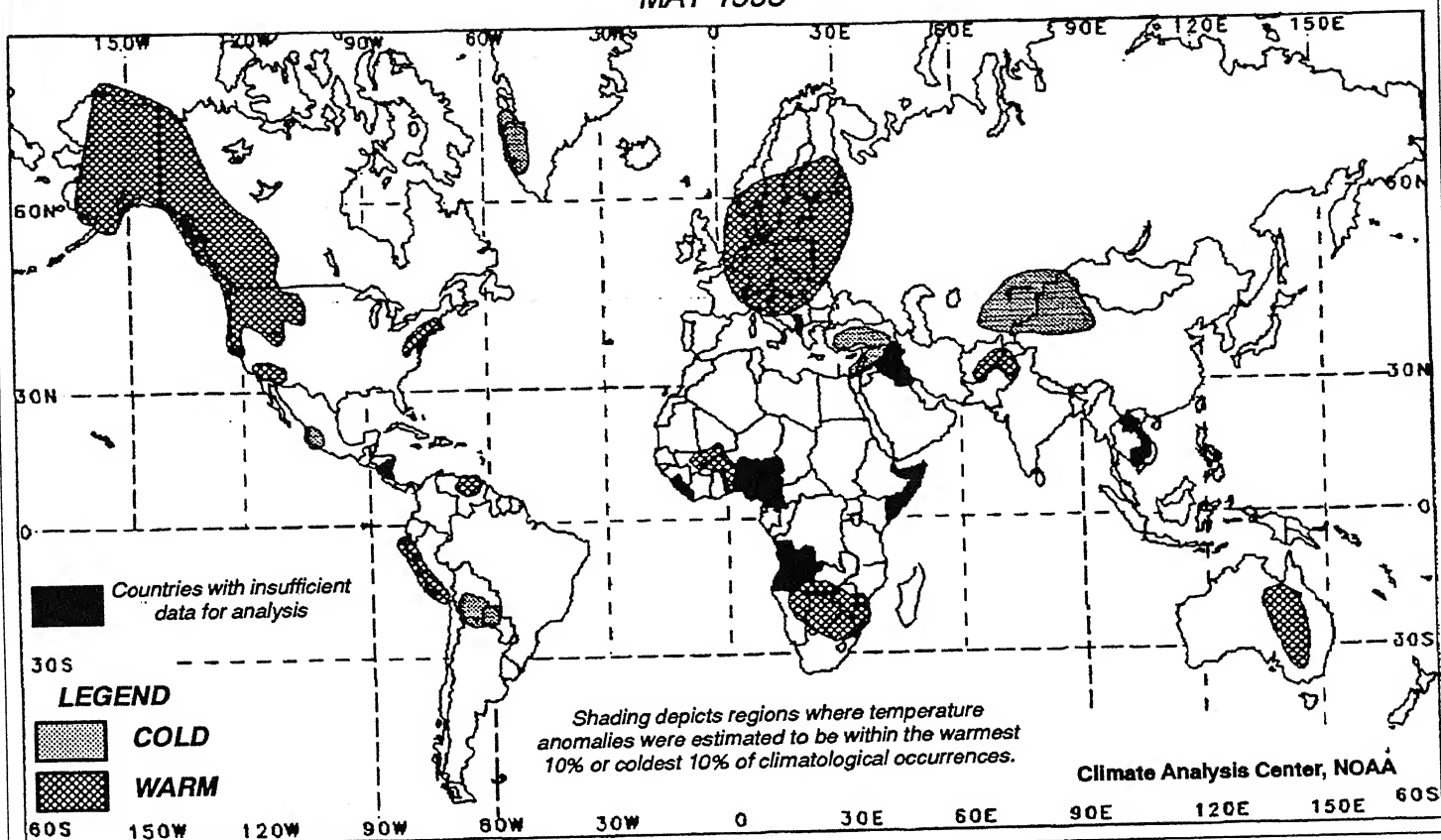
*June 13 – 19, 1993 [7 days]*



**INUNDATING RAINS SOAK SOUTHWESTERN JAPAN.** *Last week, up to 525 mm of rain deluged central Kyushu, with all but the northern fringe of the island receiving at least 135 mm. Farther east, 100–295 mm drenched central and western Shikoku and extreme southwestern Honshu while 50–110 mm fell across most of the remainder of southwestern Japan. Daily amounts of 100–210 mm were reported at a few locations, but the rains fell over a relatively long period of time (steadily throughout the week) in most areas, keeping river and urban flood-related difficulties to a minimum.*

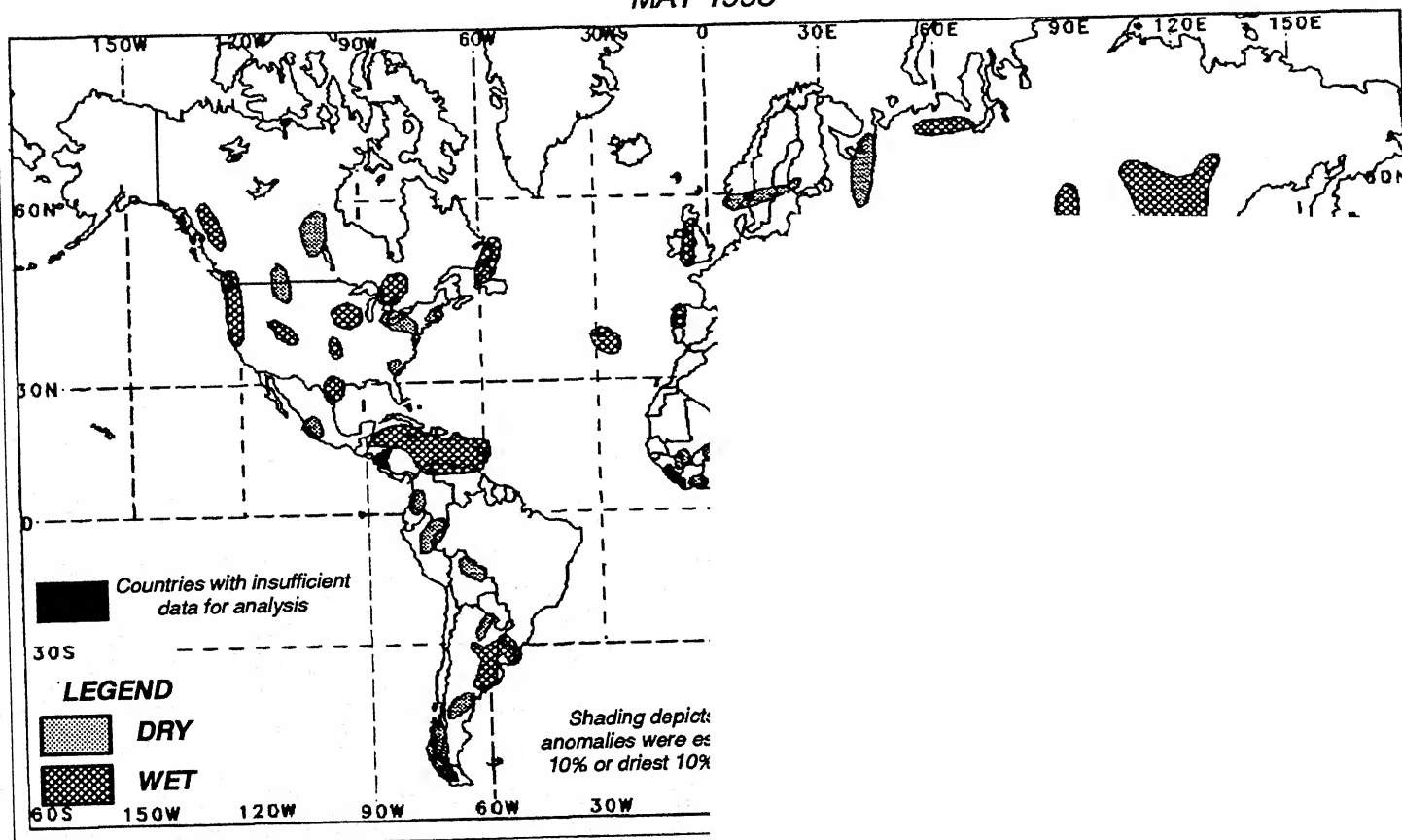
# MONTHLY GLOBAL TEMPERATURE ANOMALIES

MAY 1993



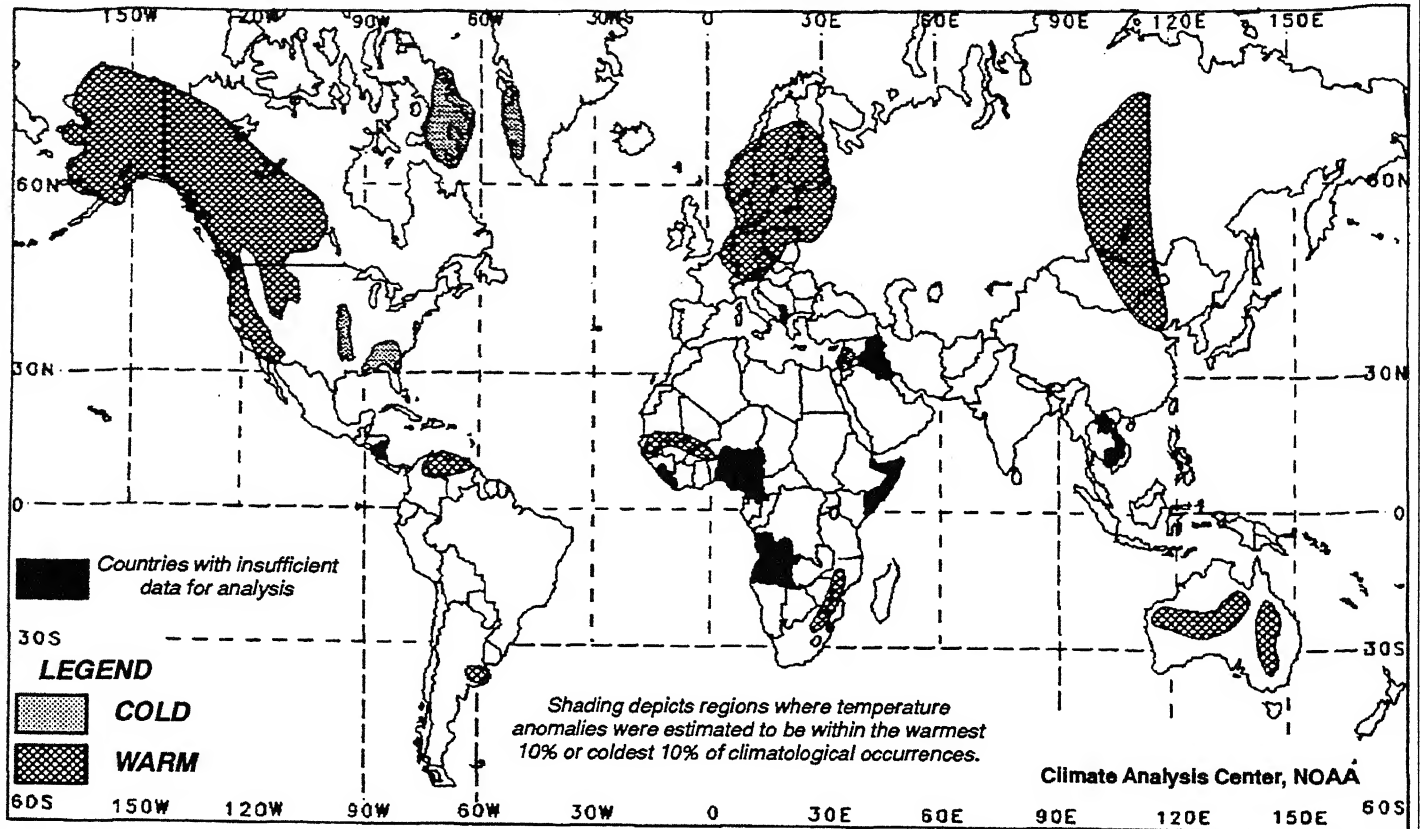
# MONTHLY GLOBAL PRECIPITATION ANOMALIES

MAY 1993



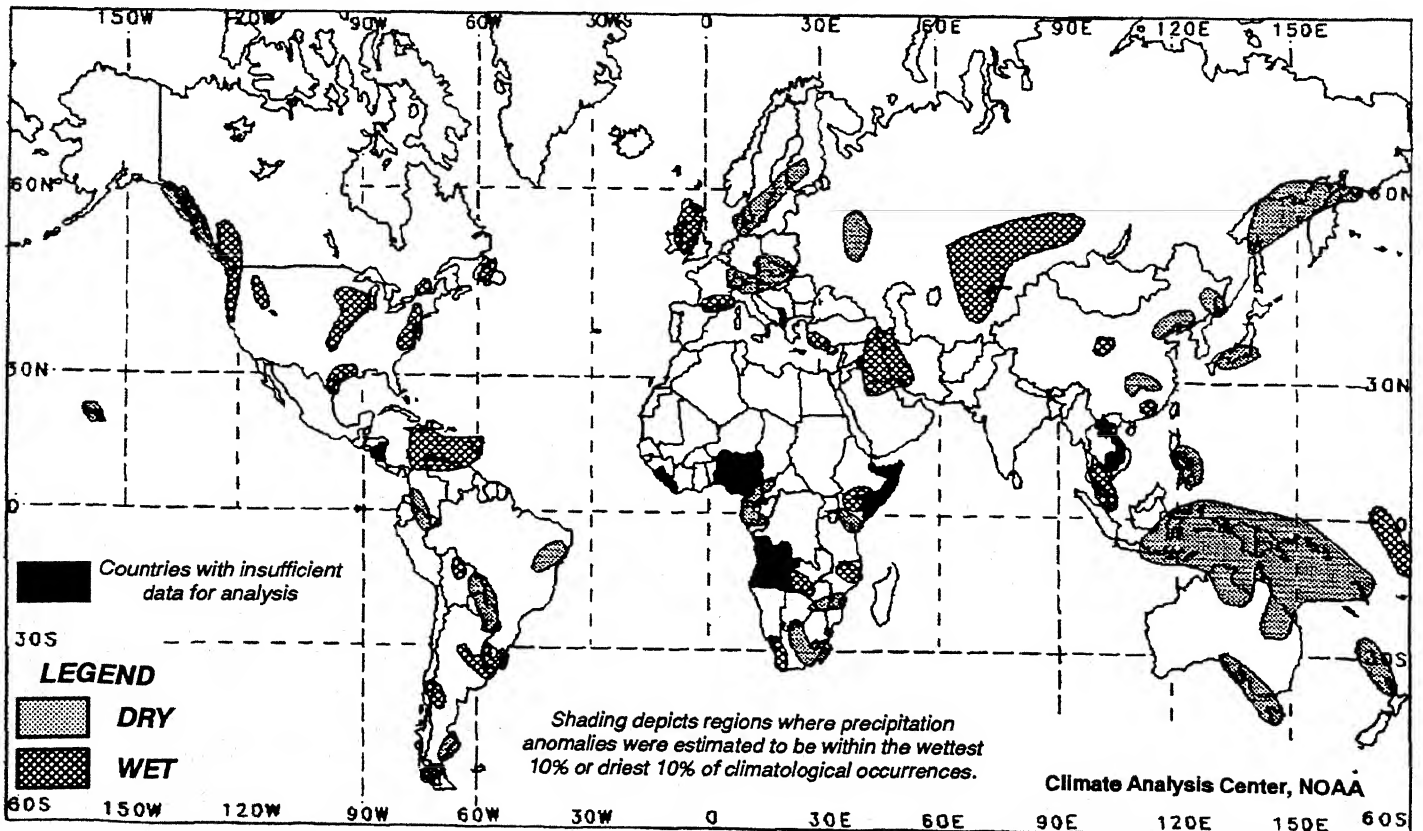
# THREE-MONTH GLOBAL TEMPERATURE ANOMALIES

MARCH – MAY 1993



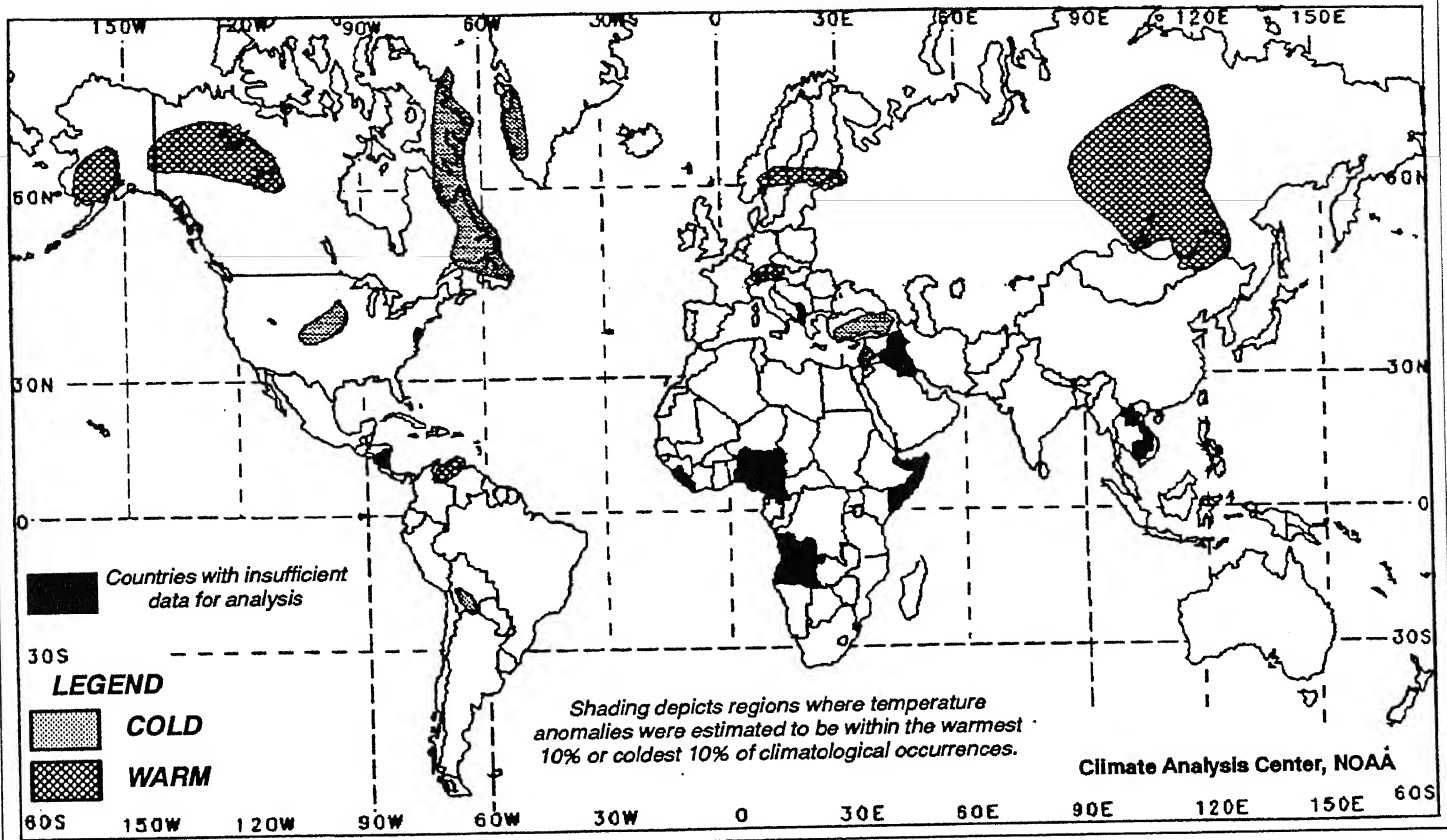
# THREE-MONTH GLOBAL PRECIPITATION ANOMALIES

MARCH – MAY 1993



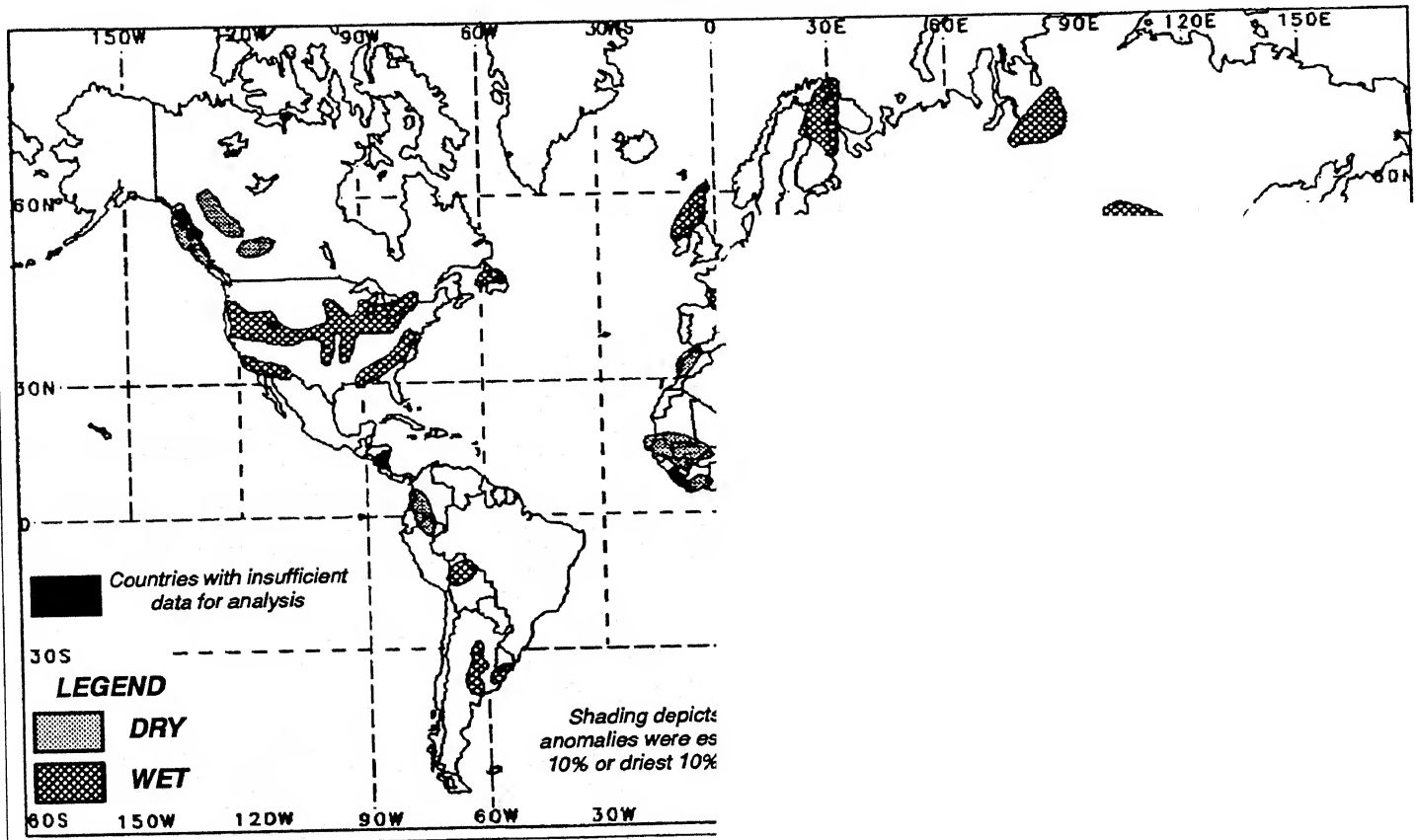
# TWELVE-MONTH GLOBAL TEMPERATURE ANOMALIES

JUNE 1992 – MAY 1993

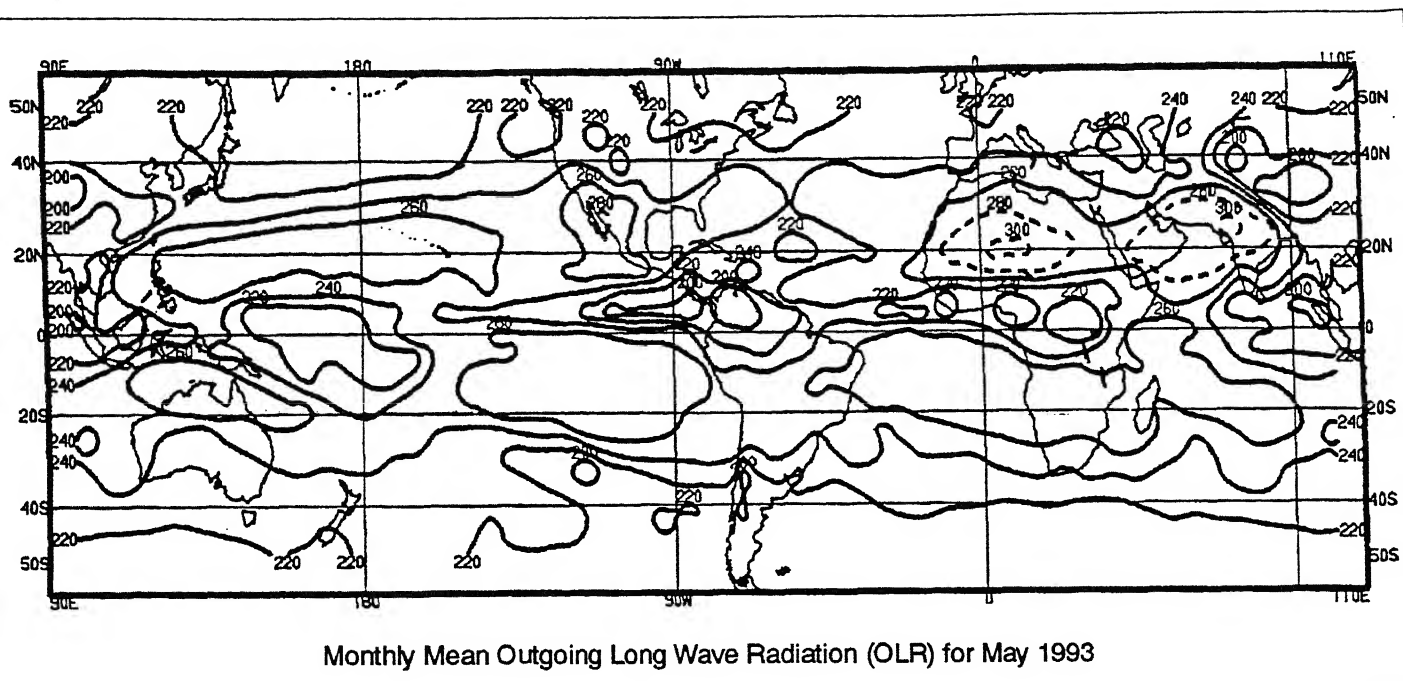


# TWELVE-MONTH GLOBAL PRECIPITATION ANOMALIES

JUNE 1992 – MAY 1993







### EXPLANATION

The mean monthly outgoing long wave radiation (OLR) as measured by the NOAA-9 AVHRR IR window channel by NESDIS/SRL (top). Data are accumulated and averaged over  $2.5^\circ$  areas to a  $5^\circ$  Mercator grid for display. Contour intervals are  $20 \text{ Wm}^{-2}$ , and contours of  $280 \text{ Wm}^{-2}$  and above are dashed. In tropical areas (for our purposes  $20^\circ\text{N} - 20^\circ\text{S}$ ) that receive primarily convective rainfall, a mean OLR value of less than  $200 \text{ Wm}^{-2}$  is associated with significant monthly precipitation, whereas a value greater than  $260 \text{ Wm}^{-2}$  normally indicates little or no precipitation. Care must be used in interpreting this chart at higher latitudes, where much of the precipitation is non-convective, or in some tropical coastal or island locations, where precipitation is primarily orographically induced. The approximate relationship between mean OLR and precipitation amount does not necessarily hold in such locations.

The mean monthly outgoing long wave radiation anomalies (bottom) are computed as departures from the 1979 – 1988 base period mean. Contour intervals are  $15 \text{ Wm}^{-2}$ , while positive anomalies (greater than normal OLR, suggesting less than normal cloud cover and/or precipitation) are dashed and negative anomalies (less than normal OLR, suggesting greater than normal cloud cover and/or precipitation) are solid.

